Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

Filed June 18, 1938 8 Sheets-Sheet 1

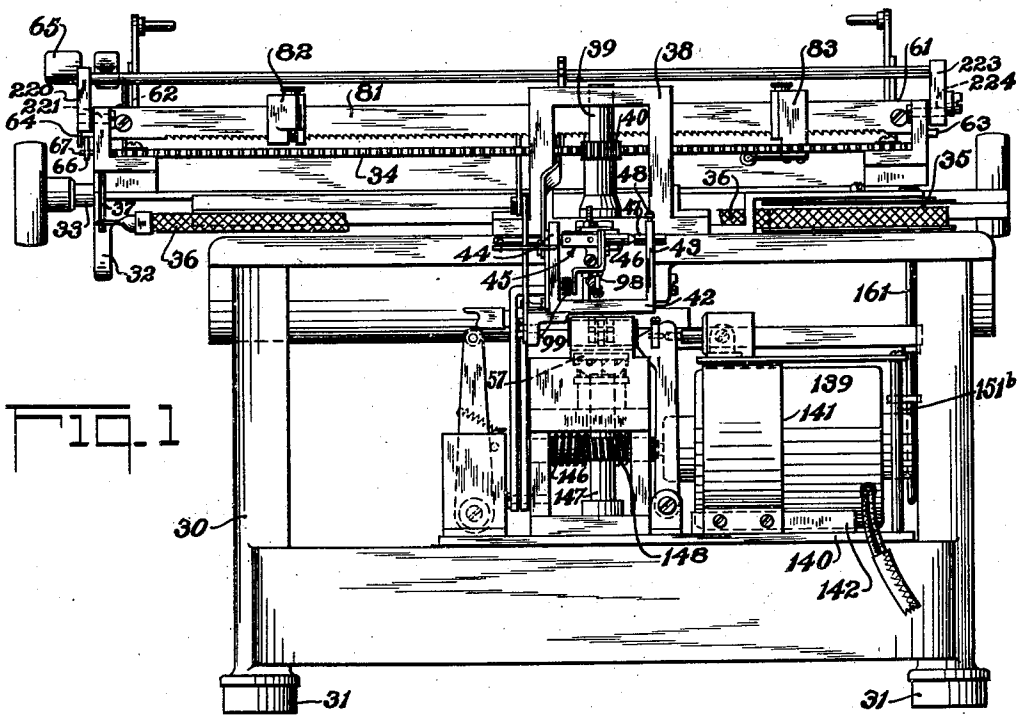


Fig. 1

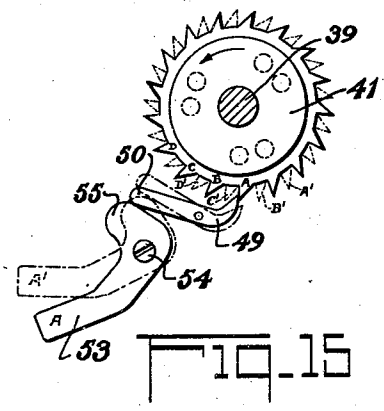


Fig. 15

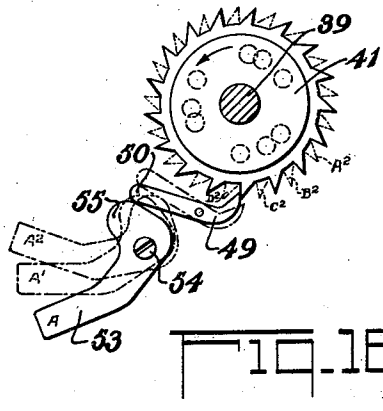


Fig. 16

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Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

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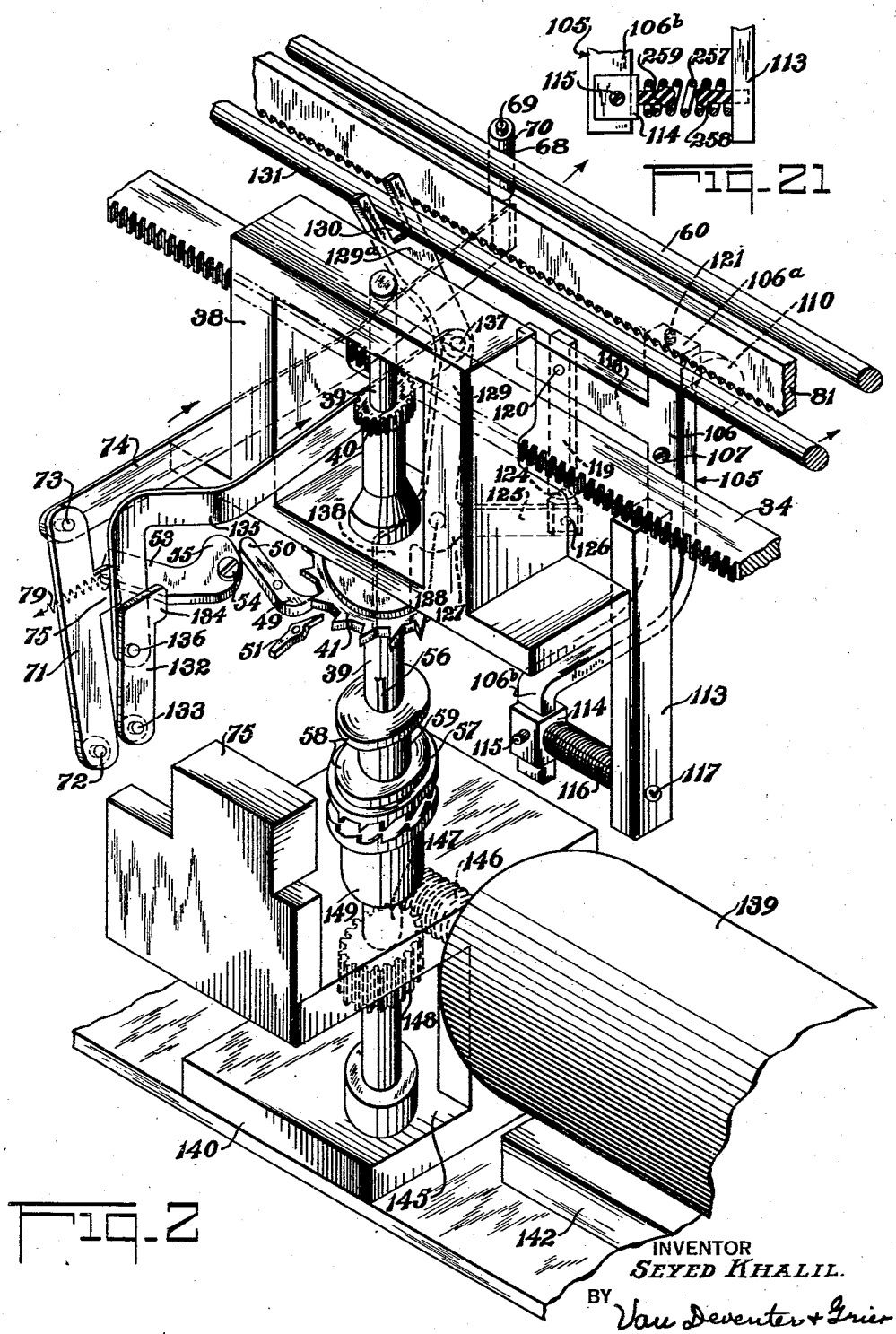


Fig. 21

Fig. 2

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Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

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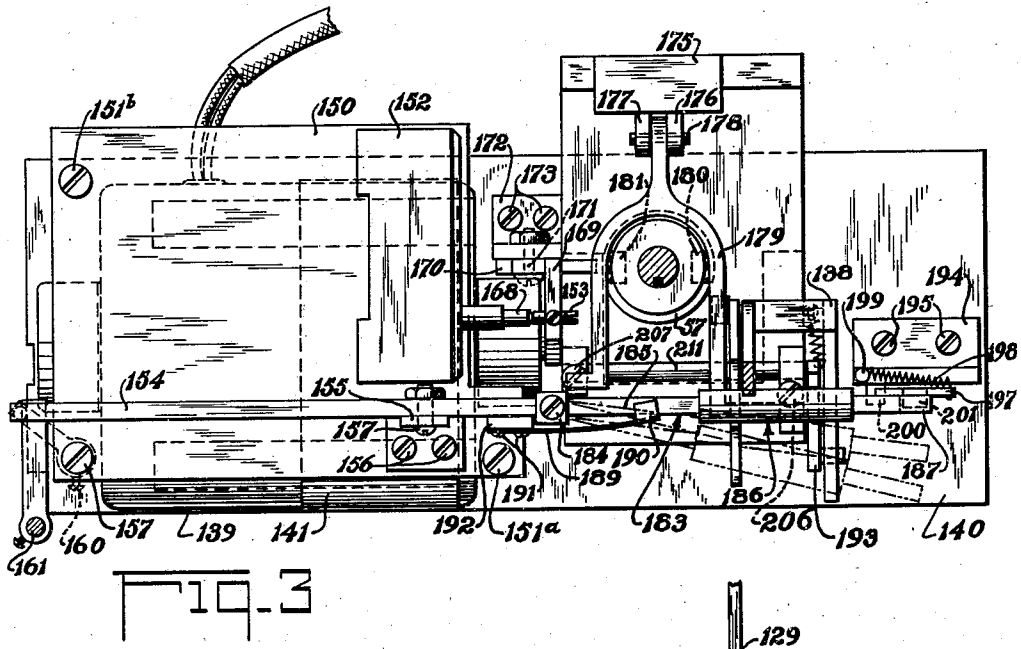


FIG. 3

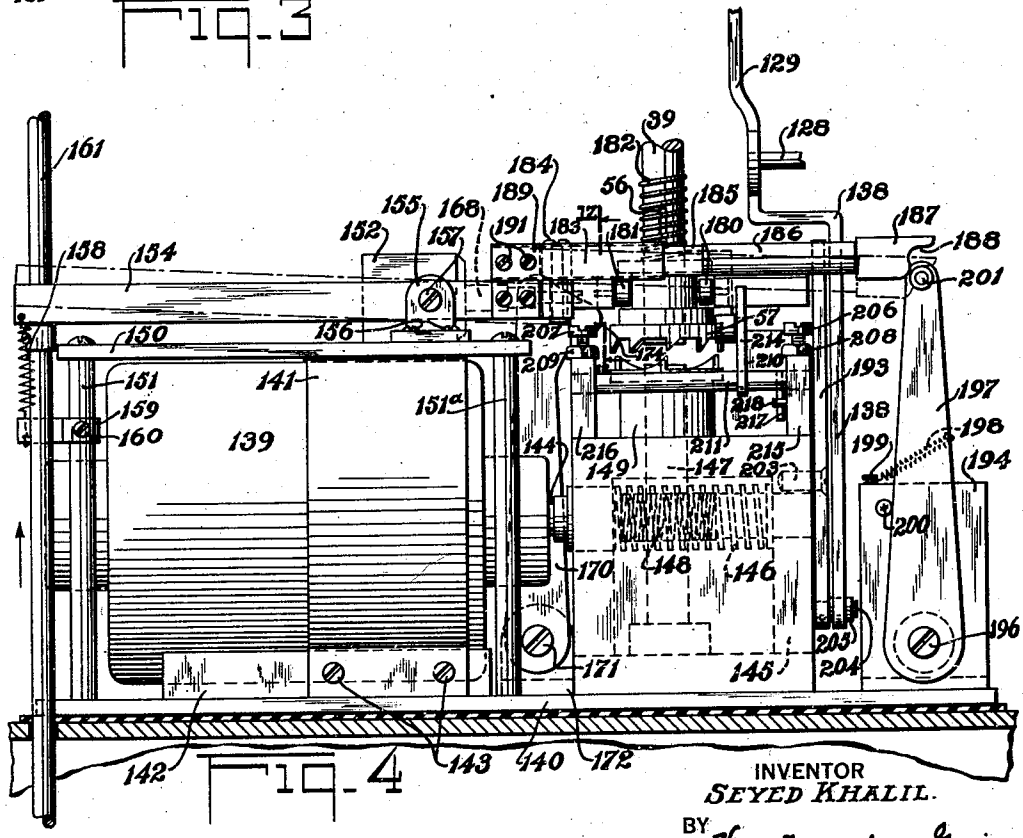


FIG. 4

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Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

Filed June 18, 1938 8 Sheets-Sheet 4

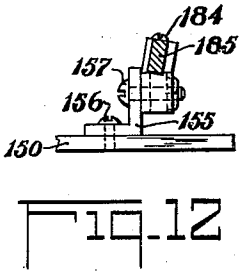


FIG. 12

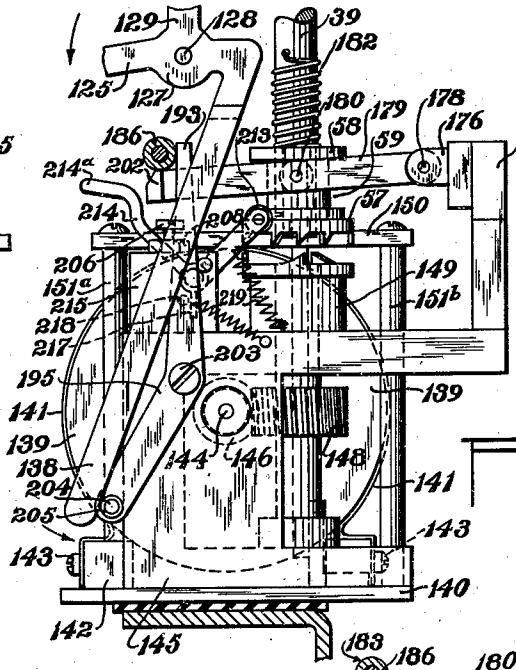


FIG. 5

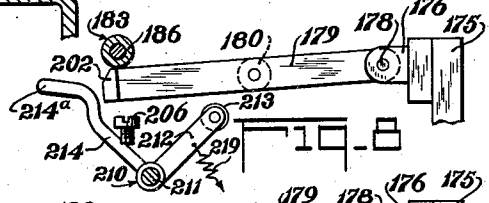


FIG. 8

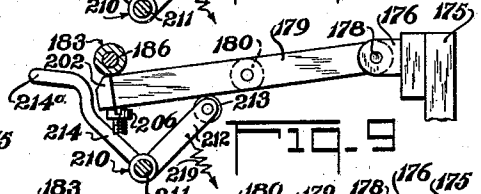


FIG. 9

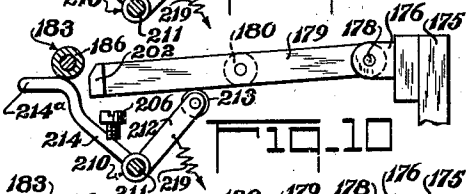


FIG. 10

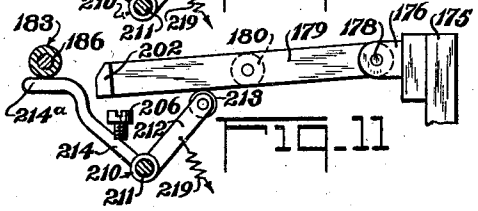


FIG. 11

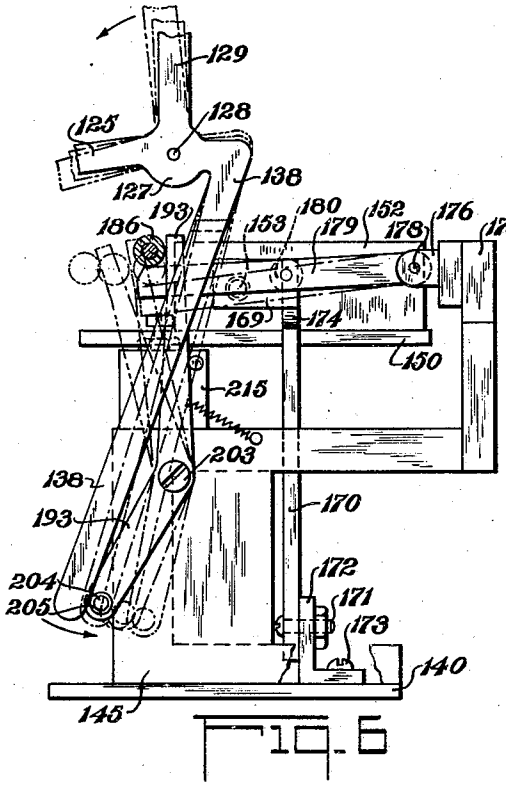


FIG. 6

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Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

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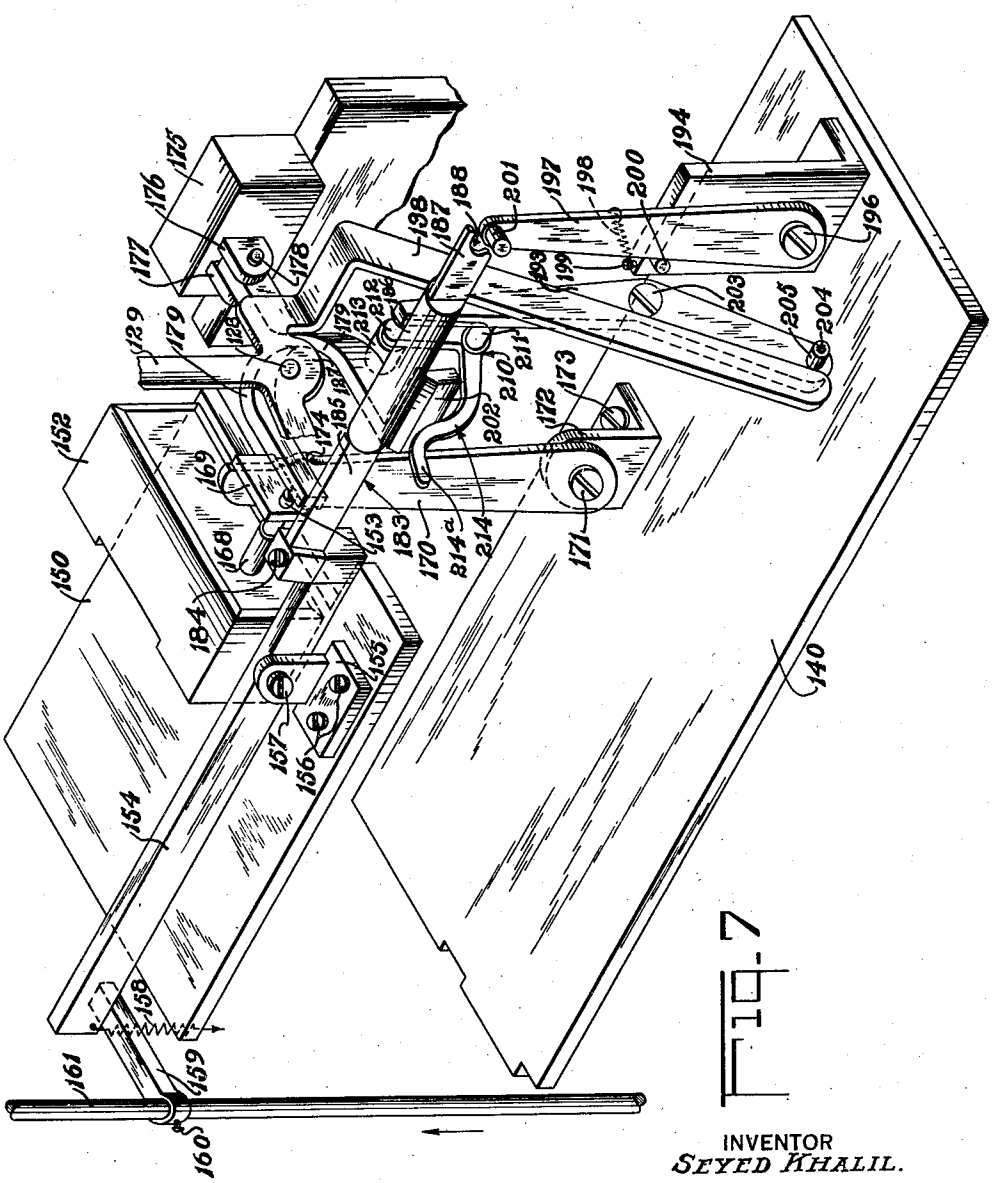


FIG. 7

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Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

Filed June 18, 1938 8 Sheets-Sheet 6

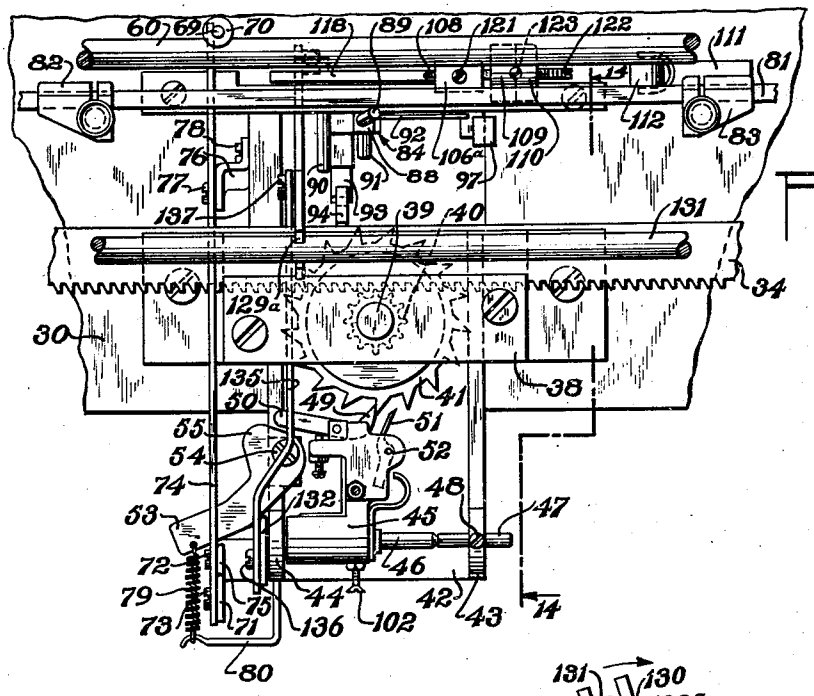


Fig. 13

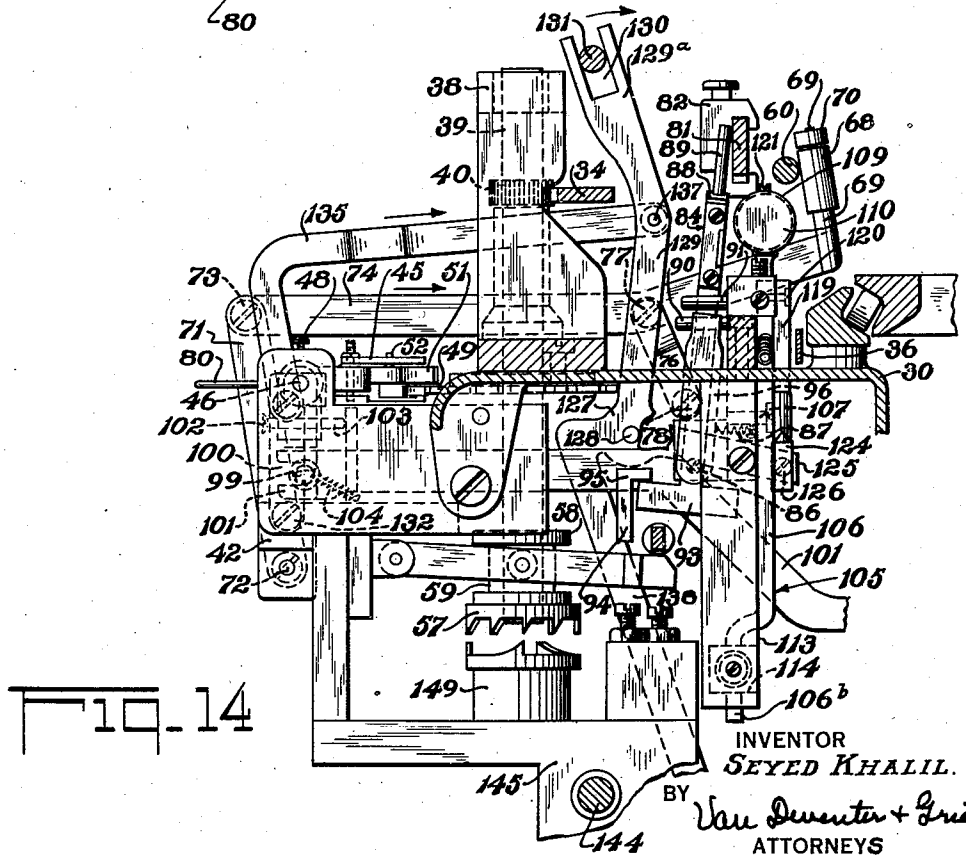


Fig. 14

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Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

Filed June 18, 1938 8 Sheets-Sheet 7

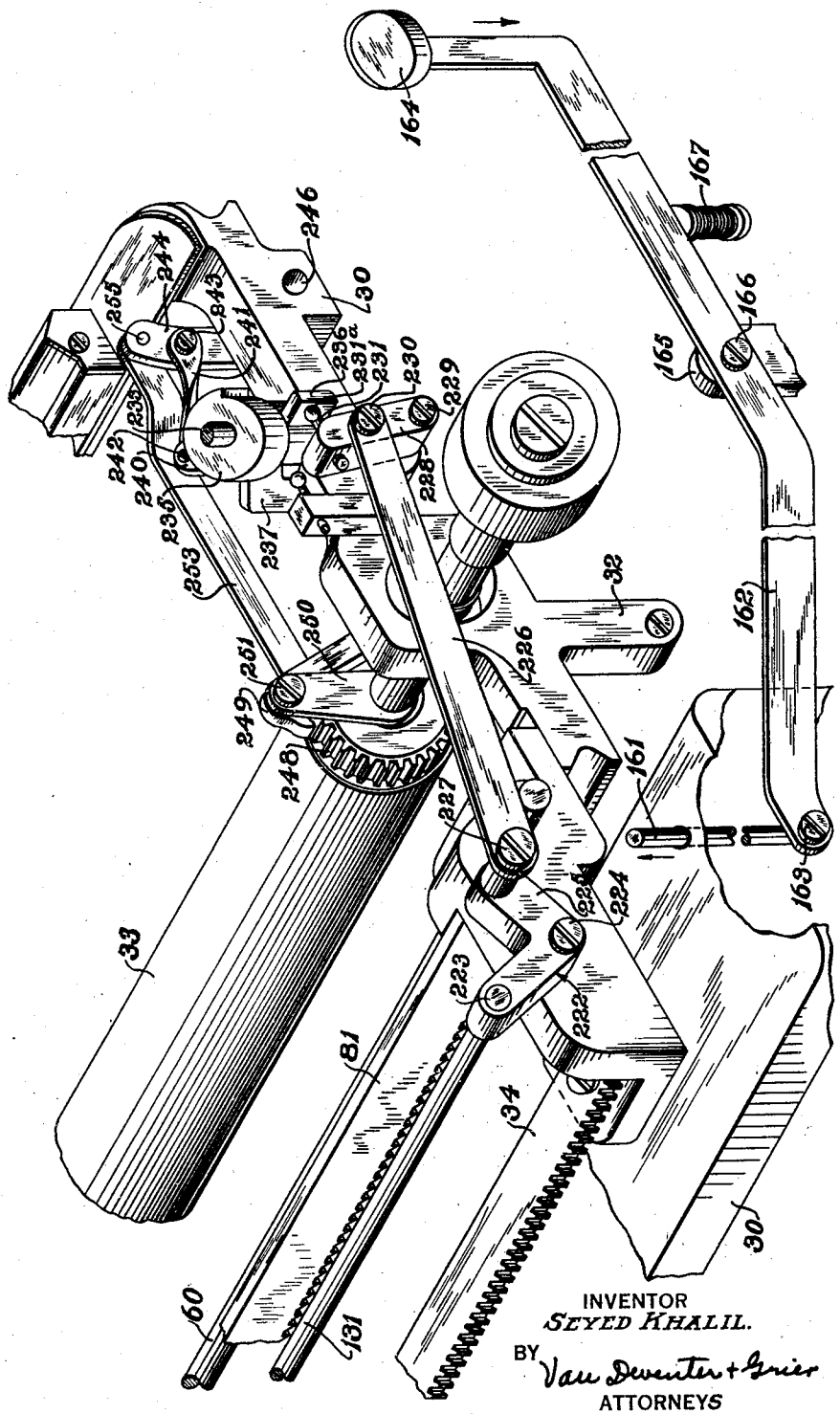


FIG-17

INVENTOR
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Oct. 7, 1941. S. KHALIL 2,258,116

TYPEWRITER

Filed June 18, 1938 8 Sheets-Sheet 8

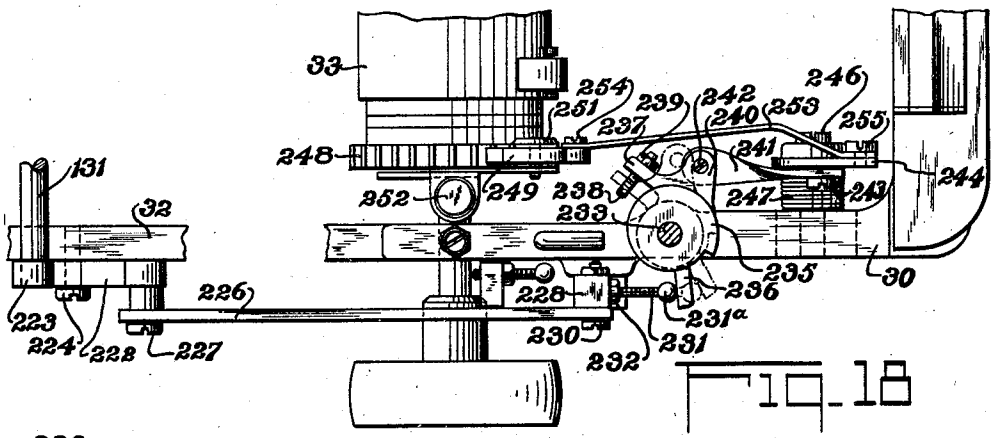


FIG. 18

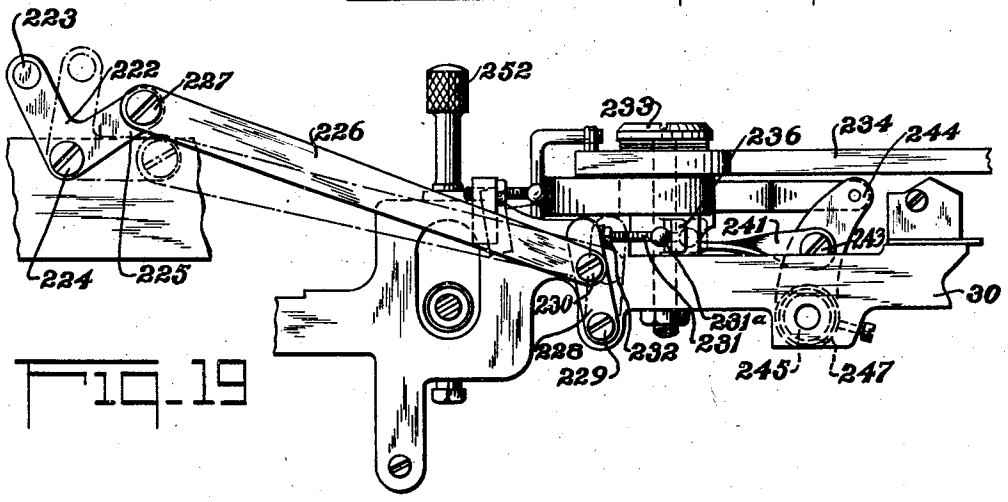


FIG. 19

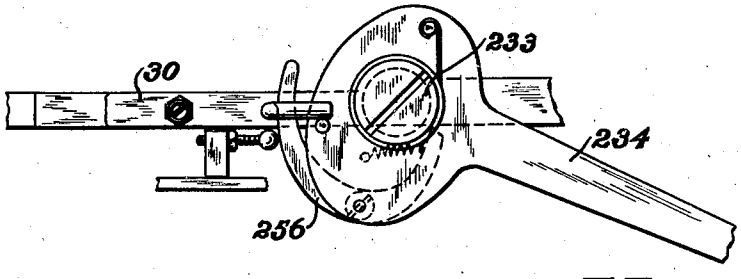


FIG. 20

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Patented Oct. 7, 1941 2,258,116

UNITED STATES PATENT OFFICE

2,258,116

TYPEWRITER

Seyed Khalil, New York, N. Y., assignor to Remington Rand, Inc., New York, N. Y., a corporation of Delaware

Application June 18, 1938, Serial No. 214,463

12 Claims. (Cl. 197—66)

This invention relates to improvements in typewriters and has for a principal object the provision of a typewriter having an electrical carriage return capable of returning the carriage, to begin a new line of typing, rapidly and without shock or rebound.

Another object of the invention is the provision in a typewriter of an escapement shaft having a pinion thereon in operative relation to a rack carried by the carriage, and the provision of a motor and means for placing said shaft in driven relation to said motor in order to return said carriage, to begin a new line of typing, rapidly and without shock or rebound.

A further object of the invention is the provision in a typewriter of a motor for returning the carriage to begin a new line of typing and of a stop control member which disassociates said motor from the typewriter carriage when the left marginal line on the carriage reaches a predetermined point on the frame of the typewriter, and decelerates the carriage in a zone in which the line is beyond said point, said control means having associated therewith shock-absorbing means for effecting the deceleration and adapted to urge the carriage out of said zone to bring said line back to said point.

Still another object of the invention is the provision in a typewriter of electrical means for returning the carriage to begin a new line of typing, a circuit associated with said means, and a key for completing and holding said circuit and breaking said circuit and declutching said means at a predetermined point regardless of whether the key is held down with the finger or merely depressed and immediately released.

Another object of the invention is the provision of a typewriter having electrical means for returning the carriage to begin a new line of typing and so arranged that the carriage may be returned by hand independently of the electric motor.

Still a further object of the invention is the provision of a typewriter having an electric carriage return operable after one or more characters have been struck.

Other objects will be apparent to those skilled in the art.

Typewriters of the prior art provided with electrical means for returning the carriage produce great shock and operate very noisily if the motor is arranged to return the carriage sufficiently fast, or else the speed of the returning carriage is sacrificed to reduce the shock and noise.

In machines of the prior art, elaborate means were provided for connecting the motor drive to the carriage, and in many instances complicated and expensive mechanism was employed. In the present invention, the usual rack and pinion of the escapement mechanism are used to return the carriage, and the escapement wheel shaft is placed in driven relation to an electric motor. A stop control device similar to that shown and described in co-pending application Serial No. 192,246, filed February 24, 1938, now Patent No. 2,232,114, issued February 18, 1941, is employed to perform the functions described in said application and other functions which will hereinafter be disclosed.

A key is provided for setting the mechanism into motion to return the carriage, and this key is effective in completing and holding the motor circuit regardless of whether it is depressed and held down, or depressed and immediately released. This key associates the escapement wheel shaft with the motor, for example by means of a clutch, and at the same time closes a switch to supply energy to the motor. The switch remains closed and the clutch remains engaged until the typewriter carriage has returned to a point where its left marginal line is in definite relation to a fixed point on the frame of the typewriter. When this point is reached, the motor current is interrupted and the clutch is disengaged, thereby removing the carriage from any further influence by the motor. However, the carriage does not stop at this point, due to the fact that the present device does not employ a stationary rigid stop such as is ordinarily used in the typewriters of the prior art.

Instead, the carriage is permitted to move in a zone beyond said point, and while so moving in said zone, its momentum is absorbed by shock absorbing means associated with the stop control device. As soon as the momentum is absorbed, the reaction of the shock absorbing means causes the carriage to move out of said zone and back to the position where the left marginal line is in line with said point.

In order to illustrate the invention, one embodiment, which is merely by way of example, is illustrated in the drawings, in which

Figure 1 is a rear view of a typewriter, according to the invention, showing the relation of the motor and the clutch to the escapement wheel shaft;

Figure 2 is a perspective view showing the relation of the motor, its reduction gear and clutch relative to the escapement wheel shaft, and other

cooperative parts of the new and improved typewriter;

Figure 3 is a plan view of the motor, the clutch, and other mechanism associated therewith;

Figure 4 is a rear elevation of the mechanism shown in Figure 3;

Figure 5 is an elevation of the motor from the gear reduction end, showing the relation of the clutch mechanism and its association with the carriage-return key;

Figure 6 is a view of some of the mechanism shown in Figure 5 showing the relation of the parts in several positions;

Figure 7 is a perspective view of the mechanism shown in Figures 5 and 6 showing the relation of such mechanism to the clutch shifter and to a switch for controlling the flow of energy to the motor;

Figures 8, 9, 10 and 11 show progressively the action of the carriage return key control rod;

Figure 12 is a sectional elevation taken along the line 12—12 of Figure 4;

Figure 13 is a plan view of the escapement mechanism, the stop control mechanism, and associated parts;

Figure 14 is an elevation partly in section taken along the lines 14—14 of Figure 13;

Figure 15 shows the relation between the escapement wheel and the rigid dog in cases where the carriage is returned with moderate force;

Figure 16 shows the relation between the escapement wheel and the rigid dog in cases where the carriage is returned with extreme force;

Figure 17 is in effect an extension of Figure 2, and shows in perspective the relation of the parts for line spacing and also shows the electric carriage return key;

Figure 18 is a plan view of the line spacing mechanism shown in Figure 17 with the hand line spacer removed;

Figure 19 is an end elevation of the mechanism shown in Figure 18;

Figure 20 is a plan view of the hand line spacing lever; and

Figure 21 is a sectional view of one form of shock absorber associated with the stop control device for absorbing the momentum of the carriage.

The typewriter, Figure 1, has a main frame **30** provided with the usual feet **31**, and is provided with the usual keys, type bars and space bar (not shown). A carriage **32** is movable on said frame and carries the usual platen **33**.

A rack **34** is carried on said carriage, preferably in a horizontal plane, so that it may mesh with a pinion carried on a vertical escapement shaft, which will presently be described.

A spring drum **35** is secured to the frame **30**, and a tape **36** carried thereby is connected to the carriage through the medium of a stud **37** carried by the carriage. A sub-frame **38**, mounted on the main frame **30**, has the escapement wheel shaft **39** pivotally mounted vertically therein. A pinion **40** is keyed or otherwise fixed to the shaft **39** and meshes with the teeth of the rack **34**. The sub-frame **38** is rigidly secured to the main frame **30**, and in the present instance the rack **34** is rigidly secured to the carriage **32**.

The shaft **39** also has operatively connected thereto an escapement wheel **41**. The relation of these parts may be very clearly seen in the perspective drawing of Figure 2. The second sub-frame or bracket **42**, secured to the main frame **30**, has upright portions **43** and **44**. A dog rocker **45** is provided with a pivotal shaft **46**, one end of which is pivotally supported on a pivot member carried in the upright **44**, and the other end of which is pivoted in the socket **47**. The socket **47** is adjustably mounted in the upright **43** and when a desired setting is obtained it may be locked in position by means of a lock screw or the like **48**. Although these parts are shown in Figure 1, they can be more clearly seen in Figure 13.

The dog rocker **45** has pivotally mounted thereon a dog **49** which normally engages a tooth of the escapement wheel **41**. The dog **49** is provided with a tail **50**, the function of which will presently be described. The dog rocker also carries a normally disengaged dog **51** which is mounted on a suitable pivot **52** and operates in the normal way.

The dog rocker **45** is provided with an extension **98** carrying a boss **99** which is engaged by a slot **100**, formed in the bar **101** (see Figure 14). The bar **101** is connected to the universal bar (not shown) of the typewriter, so that each time the key is depressed the dog rocker is moved in a clockwise direction on its pivot **46**. A screw **102** may bear against the frame at **103** and may be adjusted to define the limit of the movement of the dog rocker in the counter-clockwise direction, as viewed in Figure 14. A similar stop screw may be employed to limit the clockwise movement of the dog rocker. However, in the embodiment herein shown and described, the spring **104** holds the boss **99** against the bottom of the slot **100**, and therefore the movement of the universal bar defines the movement of the dog rocker in the clockwise direction as viewed in Figure 14.

A lever **53** mounted on the upright **44** by means of a pivot screw **54** carries a cam **55** which acts against the tail **50** of the normally engaged dog when certain functions are to be performed, as will presently be described.

In Figure 2, the dog rocker **45** and its supports have been omitted for the sake of clarity. However, the relation of the dogs **49** and **51**, and the relation between the cam **55** and the tail **50** is shown in Figure 2.

The escapement shaft **39** is provided with a key-way **56**, and a clutch member **57** is provided with a key which engages the key-way **56** so as to maintain driving relation between the clutch member **57** and the shaft **39**.

The shank **58** of the clutch member **57** has formed therein an annular groove **59** adapted to be engaged by a shifting member, to be presently described.

A rod **60** extending longitudinally of said carriage is supported on the carriage by means of bell cranks **61** and **62** at either end of the carriage. The bell crank **61** has a shaft **63** pivotally mounted in the right-hand end of the carriage, as viewed in Figure 1; and the bell crank **62** has a shaft **64** pivotally mounted in the left-hand end of the carriage, as viewed in Figure 1. The shaft **64** extends through the end of the carriage and has secured thereto a thumb lever **65**. The thumb lever **65** has an extension **66** which is normally held against a stud **67** in the carriage frame by means of a spring (not shown).

Referring now to Figures 2, 13 and 14, the rod **60** cooperates with a roller **68** carried on a shouldered shaft **69**, and the roller **68** is retained on the shaft by means of a boss **70**.

A lever **71** is pivotally mounted on the sub-frame **42** by means of a pivot screw **72**. This lever carries at its upper end a pivot screw **73** to which is pivoted a bar **74**. The lever **71** is pro-

vided with an extension 75 adapted to engage the lever 53.

The bar 74 carries on the end opposite the pivoted end, the shaft 69 which supports the roller 68, as described. A link 76 has one end connected to the bar 74 by means of a pivot screw 77, and the other end connected to the frame by means of a pivot screw 78. A spring 79 has one end connected to the lever 53 and the other end connected to an arm 80, which extends from the upright 44 for that purpose. When the thumb lever 65, shown in Figure 1, is depressed, the rod 60, through the medium of its bell crank supports, is moved in the direction of the arrows in Figure 2, thereby moving the bar 74 through the medium of the roller 68 and the shaft 69 in the direction of the arrows shown in Figure 14, thereby moving the lever 71 in a clockwise direction as viewed in Figures 2 and 14. This causes the lever 53 to move in such a direction that its cam 55, working against the tail 50 of the normally engaged dog 49, removes the engaging end of the dog 49 from out of the range of the teeth of the escapement wheel 41, thereby freeing the escapement wheel and permitting the carriage to be moved freely along the frame in either direction.

The carriage also carries a marginal rack or bar 81 having mounted thereon settable stops 82 and 83. These stops may be clearly seen in Figure 13. The stop 83 defines the left marginal line of the work and also controls the stopping of the carriage, as will presently be described. The stop 82 controls the right-hand margin of the work, and when this stop engages mechanism to be presently described, the keys are locked against any further strokes unless released by the operator, as will also be presently described.

The marginal release mechanism is identical with that shown in Figures 6 and 7 of co-pending application Serial Number 192,246 and consists of a composite lever generally designated by the numeral 84, and has its lower element 85 pivotally mounted on the frame, the pivot being designated by the numeral 86. The spring 87 normally serves to hold the upper end of the composite lever lightly against the marginal rack or bar 81 (Figure 14). The upper element 88 is pivotally mounted on the lower member 85 by means of a pivot pin (not shown), so that the upper element 88 may move pivotally on the lower element while the latter is fixed. In other words, the composite lever, as a whole, moves pivotally on the pin 86 in one plane to the left as viewed in Figure 14, and the upper element 88 of the composite lever moves pivotally on the lower element in a plane at right angles to said first plane. The upper end of the element 88 is provided with a round boss 89 which is normally positioned adjacent to the bar 81 so that it may be engaged by the stop member 82 when the carriage is moved to the extreme position to the left (which would be to the right as viewed in Figure 13).

The stop pin 90 in the frame (see Figure 13) serves to define the normal position of the composite lever 84, and a stop pin 91 serves to limit the movement of the upper element 88 on its pivot after the boss 89 is engaged by the stop member 82 above described and several characters are struck.

The upper member 88 also carries an arm 92, which in turn engages a key locking member 97 which actuates mechanism (not shown) for locking the key action.

The lower element 85 is provided with a cross arm 93 and an engaging member 94 has a hooked end 95 adapted to actuate the composite lever 84 and to move it radially in a counter-clockwise direction, as viewed in Figure 14, so as to bring the round boss 89 out of the path of the stop member 82. At this time the element 88 is urged to the rear, as viewed in Figure 14, (which would be to the left as viewed in Figure 13) by means of the leaf spring 96. Due to this movement, the arm 92, which is movable therewith, is disengaged from the locking element 97 and thereby the keys are unlocked so that the operator can add several additional letters to the line.

The stop control member, generally designated by the numeral 105, and shown in perspective in Figure 2, has a vertical portion 106 pivotally mounted on the frame by means of a pivot pin or screw 107. The upper end 106a of the vertical portion 106 has threaded therein along a line parallel to the movement of the carriage a screw 108 which in turn carries on its right end (as viewed in Figure 13) a cartridge 109 which may be faced with a disk 110 of vulcanized rubber or any other suitable non-metallic material.

The settable stop 83 is provided with a yoked extension 111 which carries a roller 112. The roller 112 is so positioned that when the carriage is being returned, the roller engages the disk 110 when the left marginal line is in line with the printing position of the type. However, the engagement of the roller 112 with the disk 110 does not cause the carriage to immediately stop at this point, and instead a series of events rapidly occur which will be hereinafter described.

The lower end 106b of the stop control member 105 is, for convenience, shown as offset, so as to be in line with an upright 113 secured to the frame, and a yoke 114 is pivotally secured to the portion 106b by any suitable means, for example by means of a pivoted pin 115. A shank (not shown in Figure 2) extends into one end of a resilient member 116, and a shank or extension 117 extends into the opposite end of the resilient member 116 so that when the stop control member is moved in a counter-clockwise direction, as viewed in Figure 2, the member 116 will resist such motion and will absorb the shock of such motion. Further details of the shock-absorbing member will be described in connection with Figure 21.

The stop control member 105 also has an arm 118 extending therefrom in a direction parallel to the path of the carriage (toward the left as viewed in Figures 2 and 13).

The arm 118 has pivotally connected thereto a link member 119 by means of a shouldered screw 120, said pivotal connection being between the upper end of the link 119 and the arm 118. The mechanism associated with the lower end of the link member 119 will be presently described. When the screw 108 is adjusted to properly position the disk 110 relative to the roller 112, this adjustment may be retained by means of a locking screw 121. A screw 122 in the frame is provided for defining the normal position of the stop control member and serves as a stop for the movement of the upper end of the portion 106a to the right, as viewed in Figure 13, and a set screw 123 is provided for locking the screw 122 after a desired adjustment is obtained.

Referring again to the link member 119, the lower end of this member, designated by the

numeral 124, is made in the form of a yoke which is pivotally connected to an arm 125 by means of a pivot screw 126. The arm 125 is preferably formed integral with a hub 127, and this hub is supported on the frame by means of a pivot shaft 128. The hub 127 also has formed integral therewith an arm 130 which will presently be described in connection with the motor control.

The hub 127 also has formed integral therewith an arm 129 extending in a general vertical direction. The upper portion 129a has a slot 139 formed therein, and a rod 131 which extends longitudinally on the carriage is at all times positioned in the slot 139. A lever 132, pivotally mounted on the frame by means of a pivot screw 133, is provided with an extension 134 at its upper end which is adapted to engage the lever 53 and move its cam into engagement with the tail of the normally engaged dog 49 and thereby to disengage the dog 49 from the teeth of the escapement wheel 41.

An L-shaped link member 135 has one end pivotally connected to the lever 132 by means of a suitable pivot screw 136, and has its other end pivotally connected to the arm 129 by means of a suitable pivot screw 137.

From this it can be seen that when the carriage is returned to the point where the roller 112 engages the disk 110, any further movement of the carriage in the direction it is being returned moves the stop control member 105 in a counterclockwise direction, as viewed in Figure 2, and due to the link 119 between the arm 118 of the stop control member and the arm 125, the arm 129 is moved in a clockwise direction, as viewed in Figures 2 and 14; and due to this movement the link 135 moves in the direction of the arrow in Figure 14, thereby pulling the extension 134 of the lever 132 into engagement with the lever 53, with the result that the cam 55 causes the normally engaged dog 49 to become disengaged from the escapement wheel teeth. If the momentum of the returning carriage is not unduly great, tooth A of the escapement wheel (see Figure 15) which was normally engaged by the dog 49 just prior to its disengagement, may move to the position A', shown in dotted lines, while the lever 53 moves from its position A to its position A', before the momentum of the returning carriage is absorbed. As soon as the momentum is absorbed, the carriage returns to the initial point due to the fact that the escapement wheel teeth are not engaged by the dog 49 and in so moving the escapement wheel tooth A, shown dotted at A', moves back to its normal position A, and at the same time the dog 49, through the medium of the cam 55, the lever 53, the link 135, the arm 129, the arm 125, the link 119, and the arm 118 of the stop control member, re-engages the tooth A exactly at the point where the left marginal line comes in line with the printing position of the type.

The cam 55 is so proportioned that even in cases where the carriage has extremely great momentum, causing the lever 53 to move even further than the position A' shown in Figure 15, the dog 49 will be moved no further than the position shown in dot-dash lines (just out of the range of the teeth of the escapement wheel 41) for example in Figure 16; if the momentum of the carriage were so great that the lever 53 were moved to the portion A^2, the dog 49, which is controlled by the cam 55, will assume the position shown in dot-dash lines, which is the same as that shown in Figure 15, and the escapement wheel tooth normally engaged by the dog 49 may move around to the position shown dotted as A^3, during which this extra momentum is absorbed. The carriage will then move in an opposition direction to bring its left marginal line in line with the printing position and while the carriage is thus moving, said escapement wheel tooth A^2 moves from the position shown dotted, in a direction opposite to that of the arrow, to become re-engaged by the dog 49, at the time the left marginal line has reached the printing position.

An electric motor 139 is mounted on a sub-base 140 which is in turn secured to the frame 30 of the typewriter. The sub-base 140 has a cradle 142 secured thereto and a strap 141 embraces the motor and is secured to the cradle 142 in any suitable manner, for example by means of screws 143. The motor shaft 144 extends horizontally into the gear housing 145 and carries a worm gear 146. The housing 145 has pivotally mounted therein a vertical shaft 147 which carries a worm gear 148 which meshes with the worm 146. The shaft 147 extends through the housing 145 and carries on its upper end a clutch member 149. The clutch member 149 is keyed to the shaft 147 and is adapted to be engaged by the clutch member 57 previously described. A platform 150 is supported on the sub-base 140 immediately above the motor by means of studs 151, 151a and 151b. A suitable switch 152 is supported on the platform 150 with its control plunger 169 in cooperative relation with a screw 153 which will presently be described. A standard 155 secured to the platform 150 by means of screws 156, carries a pivot screw 157, serving to pivotally support a lever 154. The lever 154 at its left end, as viewed in Figure 4, has secured thereto one end of a spring 158. The other end of the spring is secured to a member 159 which may be fixedly secured to the stud 151 by means of a set screw 160.

A rod 161 pivotally connected to a key lever 162 (see Figures 4 and 17) by means of a pivot screw 163 is provided for controlling the clutching of the motor to the escapement wheel shaft and the energization of the motor whenever the key 164 is depressed. The lever 162 is pivotally mounted on a lug 165 (which may be formed integral with the main frame) by means of a pivot screw 166. A spring 167 is provided for returning the key lever 162 to its normal position after being depressed. When the key is depressed, the lever 154 is moved to the position shown in dot-dash lines, Figure 4.

The screw 153 which engages the control plunger of the switch 152 is carried in a projection 169 which is in turn secured to or formed integral with a lever 170. The lever 170 is mounted on a pivot screw 171 which is secured to a bracket 172 attached to the sub-base 140 in any suitable manner such as by screws 173. The lever 170 is also provided with a projecting cam 174 the purpose of which will be presently described.

The gear housing 145 has a portion 175 extending upwardly and carrying lugs 176 and 177. A shaft 178 extends through suitable holes in the lugs 176 and 177 and forms a pivotal support for a yoke 179 (see Figures 3 to 11 inclusive).

The yoke 179 carries rollers 180 and 181 which engage the annular groove 59 formed in the shank 58 of the movable clutch member 57. The clutch member 57 is held in its upper normal

position under the urge of a spring 182 surrounding a portion of the shaft 39. Due to the relation of the yoke with its rollers 180 and 181 engaging the groove 59, the clutch member 57 may be moved downwardly as viewed in Figures 4 and 5, for example to engage the clutch member 149. The method of operating the yoke will presently be described.

When the yoke is moved downwardly to engage the clutch member 57 with the member 149, the cam portion 174 of the lever 170 is engaged by the yoke 179 and the lever 170 is moved in a counter-clockwise direction, as viewed in Figure 7, thereby causing the screw 153 to engage the switch control plunger 168 and thereby actuate the switch 152.

The lever 154 has an extension 183 pivotally secured to one end thereof by means of a pivot screw 184. The extension 183 consists of a straight portion 185, a roller portion 186, and a straight end portion 187 having formed therein a notch or hollow cam surface 188.

The lever 154 has secured thereto a leaf spring 189 by means of screws 191 and a spacer 192. A buffer 190 is secured to the outer end of the spring 189 and bears against the flat portion 185 of the extension 183 and tends to normally hold the extension in engagement with a lever 193 which will presently be described (Figures 3 and 4). For the sake of clarity, the spring and its mounting are omitted from Figure 7.

A bracket 194 secured to the sub-base 140 by screws 195 carries a pivotal support 196 for a lever 197, and a spring 198 having one end secured to the lever 197 and the other end secured to a pin 199 in the bracket 194, tends normally to hold the lever 197 against the stop pin 200.

A roller 201 carried in the upper end of the lever 197 is adapted to be engaged by the notch or hollow cam surface 188 in the end of the portion 187 of the extension whenever the lever is actuated due to the movement of the rod 161 when the carriage return key 164 (Figure 17) is depressed.

When the above occurs, the roller portion 186 of the extension engages an extension 202 formed integrally with one leg of the yoke 179, thereby moving the yoke downwardly, as viewed in Figures 4 to 8 inclusive, to the position shown in Figure 9. The limit of movement of the yoke downwardly is gauged by settable stop screws 206 and 207, and when the desired adjustment is obtained, these screws are respectively locked by means of lock nuts 208 and 209.

Due to this motion of the yoke 179, the clutch member 57 is brought into engagement with the clutch member 149, and at the same time the other leg of the yoke acting against the cam surface 174 on the lever 170 causes the screw 153 to actuate the switch control plunger 168.

The lever 193 (Figures 3 and 7) is pivotally supported on the side of the gear housing 145 by means of a pivot screw 203. The upper end of this lever, as pointed out above, is normally engaged by the roller 186. The lower end of the lever 193 is provided with a stud 204 carrying a roller 205.

The arm 138, which was previously described as formed integral with the hub 127, is offset so that its lower end is in cooperative relation with the roller 205 carried on the lower end of the lever 193. The bell crank 210 mounted on the shaft 211 has one arm 212, which at its outer end carries a roller 213, adapted to be engaged by the lower surface of one leg of the yoke 179. The other arm 214 of the bell crank has a portion 214a, which under certain conditions, which will be presently described, acts as a cam against the roller 186.

Referring now to Figure 4, the shaft 211 is journalled in uprights 215, 216, which may be extensions of the gear housing 145. The shaft 211 has the bell crank 210 permanently secured thereto, and a pin 217 extending radially from the shaft 211 engages a stop pin 218 in the upright 215. A spring 219 secured to the arm portion 212 of the bell crank 210 serves to hold the pin 217 normally against the pin 218, thereby maintaining the bell crank 210 in its normal position.

Assuming that the carriage has advanced during a line of typing to the end of the line and it is desired to return the carriage to bring the left marginal line to the printing position, the key 164, Figure 17, is depressed thereby raising the rod 161. The member 159, Figure 7, carried on the rod 161, acting against the left end of the lever 154 causes the same to move in a clockwise direction, as viewed in Figure 7, and thereby causes the surface of the notch 188 in the end of the straight portion 187 to move downwardly and engage the roller 201. As the straight portion 187 moves downwardly, the roller portion 186 acting against the extension 202 of the yoke 179 causes the yoke to move downwardly about its pivot shaft 178.

The yoke 179 in moving downwardly as just described, engages the projecting cam 174 on the lever 170 and causes the lever to move in a counter-clockwise direction, as viewed in Figure 7, with the result that the screw 153, acting against the control plunger 168 of the switch 152, effects the closure of the switch, thereby completing the motor circuit.

At the same time the yoke, in moving downwardly, brings the teeth of the clutch member 57 into engagement with the teeth of the clutch member 149 with the result that the motor, via the worm 146, the worm gear 148 and the clutch members 149 and 57 rotates the escapement shaft 39 in a counter-clockwise direction, as viewed in Figures 2 and 3. Due to the fact that the pinion 40 is meshed with the rack 34 (and it is preferably meshed at all times) the carriage is rapidly moved in a returning direction.

When the left marginal line, which is determined by the setting of the marginal stop 83, reaches the printing position, said stop engages the disk 110 carried at the upper end 106a of the vertical portion 106 of the stop control member 105, causing the stop control member to swing in a counter-clockwise direction as viewed in Figure 21, and thereby permits the marginal line to pass into a zone beyond the printing position in which zone a series of events takes place.

The momentum of the carriage is absorbed due to the fact that the lower end 106b of the portion 106 acts against the shock absorbing member 116 to absorb the momentum of the carriage.

The arm portion 118 of the stop control member 105 imparts motion to the arm 125 via the link 119. This motion is thereby imparted to the arm 138, see Figures 5, 6 and 7. The arm 138 acting against the roller 205 causes the lever 193 to move in a counter-clockwise direction and the upper end of this lever acting against the roller 186 swings the extension 183 of lever 154 in a clockwise direction, as viewed in Figure 7, about the pivot screw 184. This causes the cam surface

186 to become disengaged endwise from the roller 201 and the roller 186 then engages the end 214a of the arm 214, and causes the roller 213, carried on the arm 212, to engage the lower surface of one link of the yoke 179, raising the yoke and thereby disengaging the teeth of the clutch member 57 from the teeth of the clutch member 149.

As the yoke rises the projecting cam 174 is disengaged, allowing the lever 170 to move in a clockwise direction as viewed in Figure 7 and thereby permitting the control plunger 168 to move outwardly, whereupon the switch 152 shuts off the current from the motor.

The successive movements of the roller 186, the yoke 179, the arm 214 and the roller 213, are illustrated in Figures 8, 9, 10 and 11, and in Figure 6, the successive positions of the arm 138 and lever 193, are shown in dotted lines.

If the key 164 has been merely depressed and immediately released, the extension 183 of the pivot screw 184 will return to position the roller 186 in the normal position shown in Figures 5, 6 and 8.

On the other hand, if the key has been depressed and held down until after all of the above operations have been completed, the roller 186 will return to its normal position after the operator releases the key.

From this it can be seen that regardless of whether the operator depresses the key and immediately releases it or holds it down, the motor current will be interrupted and the motor will be declutched from the escapement wheel shaft by the stop control member when the latter is moved due to the passing of the left marginal line of the carriage into the zone described above as beyond the printing position.

The normally engaged dog 49, at the same time the above series of events are occurring, is disengaged from the teeth of the escapement wheel 41 due to the movement of the arm 129 in the direction of the arrow, Figure 2, and the imparting of this motion to the tail 50 of the dog 49 via the link member 135, lever 53 and cam 55.

Also, at the same time, the upper end 129a of the lever 129, through the medium of the slot 130, moves the rod 131 to effect line spacing as will presently be described in connection with Figures 17 to 19, inclusive.

As soon as the momentum of the carriage is absorbed the carriage then begins to move in the opposite direction, due to the urge of the main spring in the spring drum 35 which is imparted to the carriage by the tape 36.

As soon as the carriage starts moving in said opposite direction, the stop control member, due to the urge of the resilient member 116, follows up, moving in a counter-clockwise direction, as viewed in Figure 2, and permitting the dog 49 to engage the same tooth of the escapement wheel from which it was disengaged at the time the left marginal line of the returning carriage passed printing position. This insures the accurate registration of the left marginal line with the printing position due to the fact that the carriage, in moving from the position in which the shock was absorbed to the printing position, traverses such a short distance that its momentum is negligible and there cannot be any rebound of the carriage.

The relation of the dog 49 to the escapement wheel teeth is illustrated in Figures 15 and 16 and has already been described.

Referring now to Figures 17, 18 and 19, which illustrate the line spacing mechanism, the rod 131, previously referred to in the description of the act of returning the carriage, has one end secured to an arm 220 pivoted on the carriage frame by means of a pivot screw 221 and has its other end secured to the arm 223 of a bell crank 222. The bell crank is pivoted on the carriage frame by means of a pivot screw 224.

The other arm 225 of the bell crank has pivotally connected thereto a bar 226 by means of a pivot screw 227.

A lever 228 is pivotally secured to the carriage 32 by means of a pivot screw 229, and the bar 226 is pivotally connected to the lever 228 by means of a shouldered screw 230. A ball-headed screw 231 is threaded into the lever 228 and may thereby be set so that the ball 231a may extend any desired distance from the lever 228 and after the desired adjustment is obtained then it may be retained by means of a lock nut 232.

A shouldered screw 233 carries a line spacing lever 234 similar to the one described in the aforesaid application, Serial No. 192,246, so that the operator may effect line spacing independently of the automatic line spacer. Since the line spacing lever is clearly described in the aforesaid application, it will not be described in detail in the present application. The screw 233 also carries a ratchet member 235 similar to the ratchet member in the aforesaid application except that in the present application the ratchet member 235 is provided with a projecting arm 236 in cooperative relation with the ball 231a of the ball headed screw 231.

In addition to this, the ratchet member also carries a projecting arm 237 bearing stop screw 238 which may be locked in any desired setting by means of a lock nut 239. The ratchet member also carries a lug 240 which is pivotally connected to one end of a twisted bar 241 by means of a pivot screw 242. The other end of the bar 241 is, by means of a pivot screw 243, connected to a lever 244 which is provided with a hub 245 pivoted on a shouldered screw 246. This shouldered screw is secured to the frame 30 of the carriage. The hub 245 is embraced by a helical spring 247 which normally tends to maintain the lever 244 in its normal position, which is the position shown in Figure 19.

The platen 33 carries the usual ratchet wheel 248, and a ratchet 249, pivotally mounted on an arm 250 by means of a pivot screw 251, is positioned in cooperative relation with the ratchet wheel 248. The arm 250 is pivoted on the platen shaft and has linked thereto the usual setting plunger 252 (this plunger is omitted from Figure 17 for the sake of clarity).

A link member 253 has one end thereof pivotally connected to the ratchet 249 by means of a shouldered screw 254 and its other end is pivotally connected to the arm 244 by means of a shouldered screw 255.

When the rod 131 is moved in the direction of the arrow, Figure 2, in the manner described in connection with the description of the return of the carriage, through the medium of the upper end of the arm 129a and the slot 130, this motion is imparted to the ball 231a through the medium of the bell crank 222, the bar 226 and the lever 228, see Figures 17 and 18, thereby causing the ratchet member 235 to rotate on the screw 233 to the position shown in dot-dash lines, Figure 18, whereupon this movement is tranmitted via the twisted bar 241 to the lever 244 and thence via the link member 253 to the ratchet 249. This

advances the platen one or more spaces in accordance with the setting of the plunger 252.

Since this movement of the ratchet 235 is in a counter-clockwise direction, as viewed in Figures 18 and 20, the notch of the ratchet moves away from the pawl 256 and therefore the hand line spacing lever 234 is not moved about the pivot screw 233.

Referring now to Figure 21, a modification of the resilient means 116 is illustrated and consists of a helical spring positioned between the yoke 114 and the upright 113. Mounted within the spring 257 is a rubber bumper 258 projecting from the upright 113 and a similar rubber bumper 259 extending from the yoke 114.

The spring 257 is shorter than the space between the upright 113 and the yoke 114 so as to permit the stop control member 105 to move more or less freely at the beginning of its stroke, and the bumpers 258 and 259 may be provided with heads which engage each other within the spring 257 during the latter portion of the stroke of the stop control member 105. Since the bumpers are made of rubber no noise is produced when they engage each other, thereby lending silence to the operation.

The main faults of the electric return carriage typewriters of the prior art fall in three classes, a brief analysis of which will demonstrate by way of contrast the advantages of my invention as compared to devices of the prior art.

These faults are:

(*a*) If the circuit of the motor is opened at, or after the carriage reaches the stop position, the impingement of the returning carriage against the stop mechanism will produce undesirable shock and noise.

(*b*) If the circuit of the motor is opened prior to the time it reaches the stop position in order that the momentum of the motor will bring the carriage slowly against the stop mechanism, the machine is rendered unreliable because the returning carriage may not, in many instances, completely reach the stop position and thereby a crooked left marginal alignment of the typing is produced.

(*c*) If a decelerating means is installed at a position ahead of the stop, the variable distance through which the carriage returns (as the carriage may return distances varying from about one tenth of an inch to many inches) will render such a decelerating device impractical because the capacity of the decelerating means can not be automatically varied to respond to such wide variations of the displacement of the carriage. Therefore, either the condition described under (*a*) will occur, or the condition described under (*b*) will occur.

It will be seen that all faults of the stop mechanisms for electric return carriages are completely eliminated by the present invention in which a decelerating means is used beyond the stop position instead of ahead of it.

The structures herein shown and illustrated are devices with the object of reducing the noise of the returning carriage to a very low minimum and these structures permit the carriage to be returned at high speed with a minimum of noise and without shock or rebound.

Although one embodiment of the invention is herein shown and described by way of example, it must be understood that the details shown are not intended to be limitative of the invention except in so far as set forth in the following claims.

What is claimed is:

1. In a typewriting machine having a frame, a carriage movable along said frame, a rack on said carriage, a motor for returning said carriage to a position to begin a new line of typing, a circuit for said motor including a switch, driving mechanism for said carriage including a pinion meshing with said rack, a clutch between said motor and said driving mechanism and including one member movable with respect to the other, a control key, a clutch shifting and switch closing device controlled by said key and adapted to shift said movable member of the clutch into engagement with said other member and to close said switch, a settable stop on said carriage, and means controlled thereby for disassociating said key from said device and restoring said device to its inoperative position to thereby disengage said clutch and open said switch.

2. In a typewriting machine having a carriage and including a frame along which said carriage moves, a rack carried by said carriage, an escapement wheel shaft, a pinion on said shaft meshing with said rack, an escapement wheel connected to said shaft and having escapement dogs in cooperation therewith, an electric motor, clutch means for operatively connecting said motor to said shaft for returning said carriage to begin a new line of typing, a settable finger carried on said carriage for defining the point at which said line shall begin, a control member pivotally mounted on said frame, linked to said clutch means and adapted to be engaged by said finger for disassociating said motor from said shaft, and means also linked to and controlled by said member for disengaging one of said dogs from said escapement wheel and for maintaining the disengaged dog out of engagement with said wheel during the entire time said finger engages said control member.

3. In a typewriting machine, a frame, a carriage movable along said frame, a main spring supported on said frame and connected to said carriage, a rack carried by said carriage, a shaft carrying a pinion meshing with said rack, an escapement wheel operatively connected to said shaft, dogs cooperating with said escapement wheel to permit said carriage to move along said frame in steps as the typing progresses, a motor on said frame, a clutch between said motor and said shaft for placing said carriage in driven relation to said motor, whereby said carriage may be moved along said frame in a direction opposite to said progressive movement, a circuit for said motor including a switch, a key and linkages between said key, the clutch and the switch for engaging said clutch and closing said switch thereby causing said carriage to move in said opposite direction, a settable stop on said carriage, a stop control member having a shock-absorbing means associated therewith, said stop control member being adapted to be engaged by said stop when the carriage reaches a predetermined point determined by said settable stop, mechanism associated with said stop control member and said linkages between said key, said clutch and said switch for disengaging said clutch and opening said switch when said stop control member begins to function, and other linkages connected to said stop control member for disassociating one of said dogs from the escapement wheel when said carriage reaches said predetermined point, thereby permitting the latter to move beyond said point into a zone in which its momentum is absorbed by said shock absorbing means and to be moved

back toward said point under the urge of said main spring until said point is again reached.

4. A typewriting machine having a frame, a main spring on said frame, an escapement mechanism, a carriage connected to said spring and movable along said frame under the urge of said spring and under control of said escapement mechanism as the typing progresses, a motor for returning said carriage to a predetermined position to begin a new line of typing, a circuit for said motor including a switch, driving means for said carriage, a clutch between said motor and said driving means, a stop control member mounted on said frame, shock-absorbing means associated with said member, linkages between said stop control member, said switch and said clutch; a key and mechanism associated therewith including a lever cooperating with said linkages for closing said switch and engaging said clutch, a settable finger associated with said carriage adapted to engage said stop control member when said carriage has returned to said position, thereby causing said switch to open, and said clutch to be disengaged, whereby said carriage moves in a zone beyond said position under its momentum and comes to rest when said momentum is absorbed by said shock-absorbing means; and means also controlled by said stop control member for freeing said escapement mechanism during the entire time said carriage is in said zone, whereby said main spring urges said carriage from the point where it comes to rest to said position.

5. In a typewriting machine, a frame, a carriage movable along said frame, a rack on said carriage, a shaft, a pinion secured to said shaft and meshed with the teeth of said rack, an escapement wheel connected to said shaft, escapement dogs in cooperative relation with said wheel, a motor on said frame, mechanism including a clutch for placing said carriage in driven relation to said motor, a circuit for said motor including a switch, a key having linkages associated therewith for engaging said clutch and closing said switch whereby said motor may return said carriage to a position to begin a new line of typing; and means controlled by said carriage for disengaging said clutch, opening said switch, and disassociating one of said dogs from the escapement wheel when said carriage reaches a predetermined point in its return movement.

6. In a typewriting machine, a frame, a carriage, a rack carried on said carriage, a shaft journalled on said frame, a pinion on said shaft and normally maintained in operative relation to said rack, an escapement wheel connected to said shaft, a dog rocker pivotally mounted on said frame, a dog on said rocker normally in engagement with a tooth of said wheel, an electric motor, a shaft associated with said motor and positioned in endwise relation to said first shaft, a clutch comprised of a member on each of said shafts, a circuit for said motor including a switch, a key having mechanism associated therewith cooperating with said clutch and said switch and adapted to effect the engagement of said clutch members and to close said switch; mechanism partly on said carriage and partly on said frame for disengaging said clutch members, opening said switch and disengaging said dog from the escapement wheel and thereby permitting the carriage to move in a zone beyond the point at which a marginal line on the carriage reaches the printing position, when the carriage is being returned; and spring means associated with said mechanism adapted to absorb the momentum of said carriage.

7. In a typewriting machine, a frame, a main spring carried on said frame, a carriage connected to said spring and movable along said frame, an escapement therefor including a shaft geared to said carriage, an escapement wheel connected to said shaft, and dogs in cooperative relation with said escapement wheel, a settable member on said carriage for defining the initial starting point of the typing in respect to the printing position of the type, a stop control device pivotally mounted on said frame and adapted to be engaged by said member from the time the carriage moves its initial starting point beyond said position until it returns said point to said position, linkages between said device and one of said dogs in said escapement for disengaging said dog from and freeing the escapement wheel during the time said point is beyond said position, resilient means associated with said device for decelerating said carriage while said point is beyond said position, motor means for moving said carriage in a direction opposite to the direction in which it moves when the typing is in progress, said motor means including a shaft positioned adjacent to said first shaft, a clutch comprised of members on each of said shafts, and linkages between said device and said clutch for disengaging the members of said clutch when said point first reaches said position, said main spring being adapted to move said carriage after it has been decelerated by said resilient means to bring said point from its decelerated position to said printing position where, due to said linkages, said disengaged dog reengages said escapement wheel.

8. In a typewriting machine, a frame, a carriage, an escapement therefor including a shaft geared to said carriage and having an escapement wheel connected thereto, a dog normally in cooperative relation with said escapement wheel, a settable stop finger on said carriage for defining the initial starting point of the typing with respect to the printing position on the type, a stop control device pivotally mounted on said frame and adapted to be engaged by said finger from the time the carriage moves its initial starting point beyond said position and until it returns said point to said position, motor means including a shaft positioned adjacent to said first shaft, a clutch between said shafts adapted when engaged to place said first shaft in driven relation to said second shaft, a circuit for said motor means including a switch, key controlled means for engaging said clutch and closing said switch, linkages between said device, said clutch and said switch for disassociating said clutch and for opening said switch during the time said point is beyond said position, other linkages between said device and said dog for disengaging said dog from the escapement wheel during the time said point is beyond said position, and resilient means associated with said device for decelerating said carriage while said point is beyond said position.

9. In a typewriting machine, a frame, a main spring on said frame, a carriage connected to said spring and movable along said frame, an escapement rack on said carriage, an escapement shaft on said frame, a pinion carried on said shaft and meshing with the teeth of said rack, an escapement wheel connected to said shaft, a dog normally in cooperative relation with said escapement wheel, motor means on said frame, key controlled means for associating said pinion in driven

relation with said motor means and starting the latter to operate for returning said carriage to its initial position to begin a new line of typing, a settable stop finger on said carriage defining said initial position, a control member pivoted on said frame adapted to be engaged by said stop finger, linkages associated therewith for disengaging said dog from said escapement wheel thereby enabling said returning carriage to move in a zone beyond said initial position, said dog remaining disengaged during the entire time said carriage is in said zone, a shock absorbing device associated with said control member for absorbing the momentum of said carriage in said zone, and means controlled by said member for disassociating said pinion from the motor means at the threshold of said zone and causing the latter to cease operating, said carriage being free to move under the urge of said main spring from the point at which its momentum is absorbed to said initial position due to the disengagement of the dog from the escapement wheel.

10. In a typewriting machine having a carriage and including a frame along which said carriage moves, a rack carried by said carriage, an escapement wheel shaft, a pinion on said shaft and meshing with said rack, an escapement wheel connected to said shaft and having a normally engaged dog in cooperation therewith, an electric motor, clutch means for operatively connecting said motor to said shaft for returning said carriage to begin a new line of typing, a settable finger on said carriage for defining the point at which said line of typing shall begin, a control member carried on said frame linked to said clutch means and adapted to be engaged by said finger for disassociating said motor from said shaft when said point is reached by the carriage, said control member being movably mounted for permitting said carriage to move under its own momentum beyond said point in a zone where the momentum is absorbed, and means connected to said control member and associated with said dog for disengaging the latter from the teeth of said escapement wheel and holding it out of engagement therewith during the time said carriage is moving in said zone.

11. In a typewriting machine, a frame, a carriage movable along said frame, a spring drum on said frame and operatively connected to said carriage, escapement mechanism carried jointly by said frame and said carriage and arranged to normally prevent movement of the carriage under the force of said spring drum, a motor on said frame, drive mechanism including a clutch for operatively connecting said motor to said carriage to move the latter against the force of said spring drum, an energizing circuit for said motor including a switch, manually operable means for engaging said clutch and closing said switch, and means carried jointly by said frame and said carriage for disengaging said clutch, opening said switch and rendering said escapement mechanism inoperative when the carriage is moved to a predetermined position against the force of said spring drum.

12. In a typewriting machine, a frame, a carriage movable along said frame, a spring drum on said frame and operatively connected to said carriage, escapement mechanism carried jointly by said frame and said carriage and arranged to normally prevent movement of the carriage under the force of said spring drum, power carriage returning mechanism, means for operatively connecting said power carriage returning mechanism to said carriage to move the latter against the force of said spring drum, and means carried jointly by said frame and said carriage for disconnecting said power carriage returning mechanism from said carriage and rendering said escapement mechanism inoperative when the carriage is moved to a predetermined position against the force of said spring drum.

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